



## PCT

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 04/020 WO	<b>FOR FURTHER ACTION</b>		See Form PCT/IPEA/416
International application No. PCT/CH2005/000142	International filing date (day/month/year) 10.03.2005	Priority date (day/month/year) 16.03.2004	
International Patent Classification (IPC) or national classification and IPC INV. F03D9/02 F02C6/14 F02C7/10 F03D9/00			
Applicant ABB RESEARCH LTD et al			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 2 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand  24.09.2005		Date of completion of this report  15.05.2006	
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized officer  O'Shea, G  Telephone No. +31 70 340-4424 	

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/CH2005/000142

---

**Box No. I Basis of the report**

---

1. With regard to the **language**, this report is based on

- ☒ the international application in the language in which it was filed
- ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
  - ☐ international search (under Rules 12.3(a) and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4(a))
  - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements**\* of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

**Description, Pages**

1-10 as originally filed

**Claims, Numbers**

1-10 filed with the demand

**Drawings, Sheets**

1/2, 2/2 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/CH2005/000142

---

**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

---

1. Statement

Novelty (N)	Yes: Claims	1-10
	No: Claims	
Inventive step (IS)	Yes: Claims	1-10
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-10
	No: Claims	

2. Citations and explanations (Rule 70.7):

**see separate sheet**

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Reference is made to the following documents:

- D1: US-A-5 384 489 (BELLAC ALPHONSE H) 24 January 1995 cited in the application
- D2: NL-A-8 005 063 (JOHAN WOLTERUS VAN DER VEEN) 1 April 1982
- D3: GB-A-2 246 602 (DALE ELECTRIC OF GREAT BRITAIN) 5 February 1992

2. In present claims 1 and 9, the expression "for generating electricity" has been interpreted such that thermal energy from the heat storage device is transferred to the thermodynamic machine with the goal of generating electricity (i.e. the added thermal energy is directly used in the thermodynamic machine to generate electricity). Furthermore, present claim 9 has been interpreted as including the step of providing thermal energy via the second heat generating means (i.e. as if the expression "if necessary" were not present). With such an interpretation the subject-matter of claims 1 and 9 would seem to satisfy the requirements of Article 33 PCT in respect of novelty and inventive step.

- 2.1 Document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and shows (the references in parentheses applying to this document):

A system (see figure 1) for providing thermal energy to a thermodynamic machine (64) for generating electrical power, comprising:  
a heat storage device (44) for storing thermal energy and a first heat transfer means (52) for transferring thermal energy from the heat storage device to the thermodynamic machine (64) for the purposes of generating electricity, first heat generating means (34) for heating the heat storage device with electrical power.

The subject-matter of claim 1 differs from this known system in that second heat generating means are provided for providing thermal energy to the thermodynamic machine.

The problem to be solved by the present invention may be regarded as how to balance a time dependent discrepancy between electricity demand and supply.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

Provision of an extra heat generating means allows the thermodynamic machine to continue generating electricity even when the stored heat has run out. This is particularly important in isolated areas which, for example, are not connected to the electricity grid. The supply of power is therefore not interrupted, even during long periods of non-availability of the primary power source (eg. wind, solar energy etc.). Document D2 relates to converting wind-derived electricity into heat for heating a building, any excess heat being transferred to a boiler in a steam circuit to power a steam turbine, which in turn, returns the generated electricity to the grid. There are no storage means in the system of D2 nor any motivation to store excess energy. D3 discloses a dump circuit where excess electrical power can be stored by means of heating water, which, in turn, is used in the cooling circuit of a diesel engine. However, the fact that such heated water is not directly used as a working fluid in this thermodynamic machine, means that D3 is neither novelty destroying nor relevant for assessing the inventive step of claim 1. The skilled person is therefore not provided with any hints or teachings which would prompt him/her to modify the device disclosed in D1 to arrive at a system having the features of present claim 1.

- 2.2 The same reasoning applies, mutatis mutandis, to the subject-matter of the independent method claim 9 which therefore also meets the requirements of the PCT with respect to novelty and inventive step.
- 2.3 Claims 2-8 and 10 are dependent on claims 1 and 9 respectively and as such also meet the requirements of the PCT with respect to novelty and inventive step.